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PATENT & TRADEMARK OFFICE

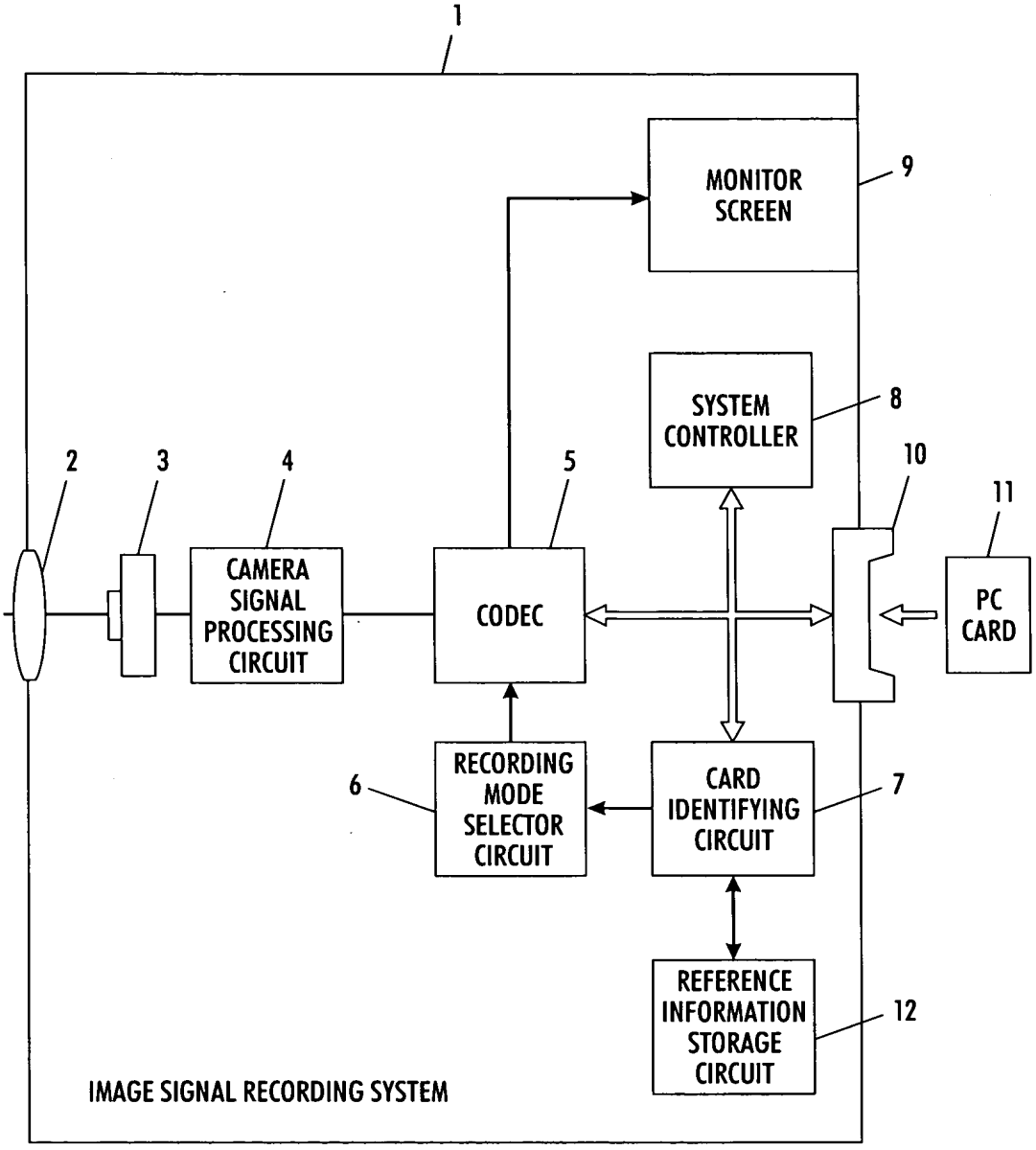

FIG. 1
PRIOR ART

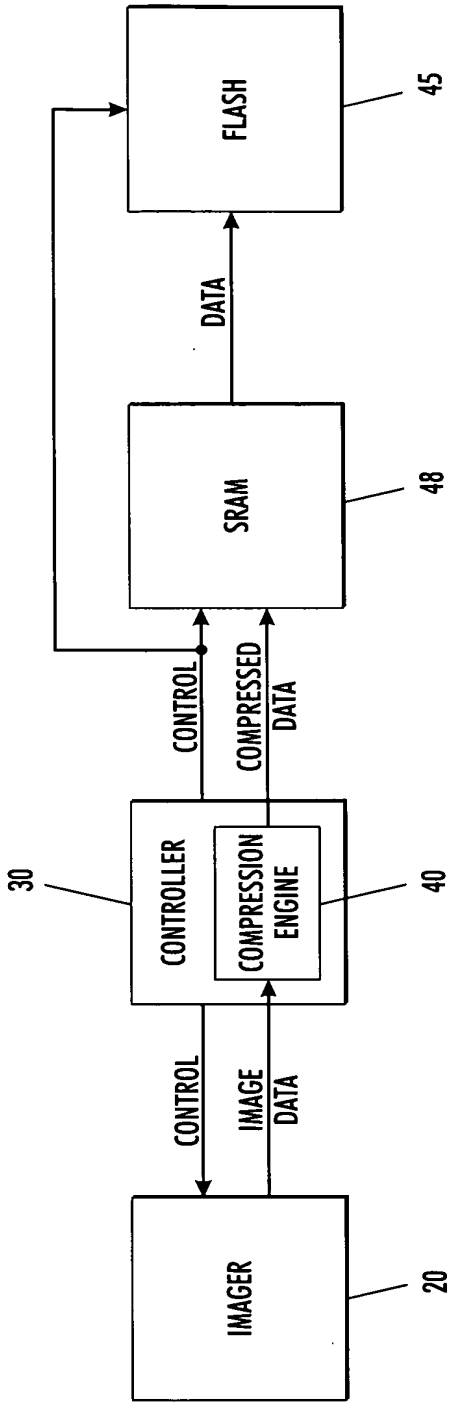
FLASH
45
DATA
SRAM
48
CONTROL
COMPRESSED DATA
30
CONTROLLER
COMPRESSION ENGINE
40
CONTROL
IMAGE DATA
IMAGER
20

FIG. 2

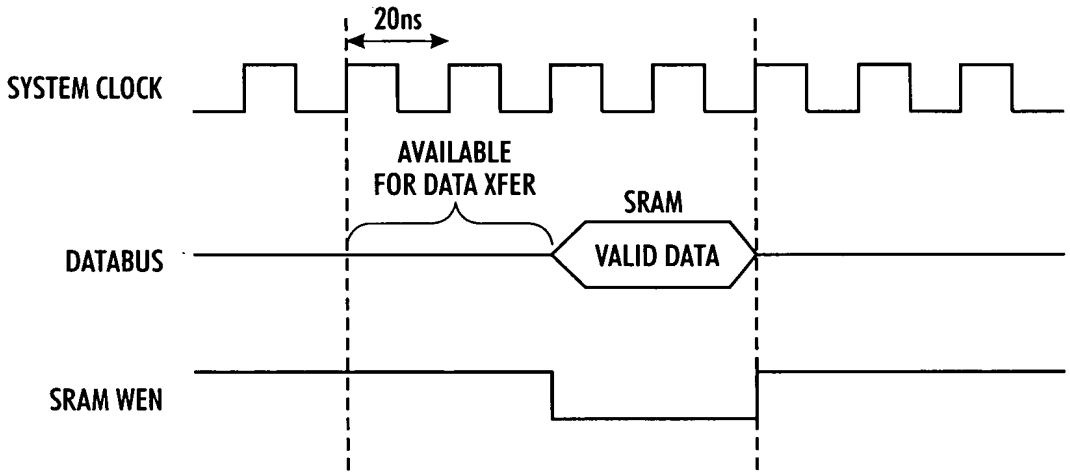
20ns
SYSTEM CLOCK
AVAILABLE
FOR DATA XFER
SRAM
VALID DATA
DATABUS
SRAM WEN

FIG. 3

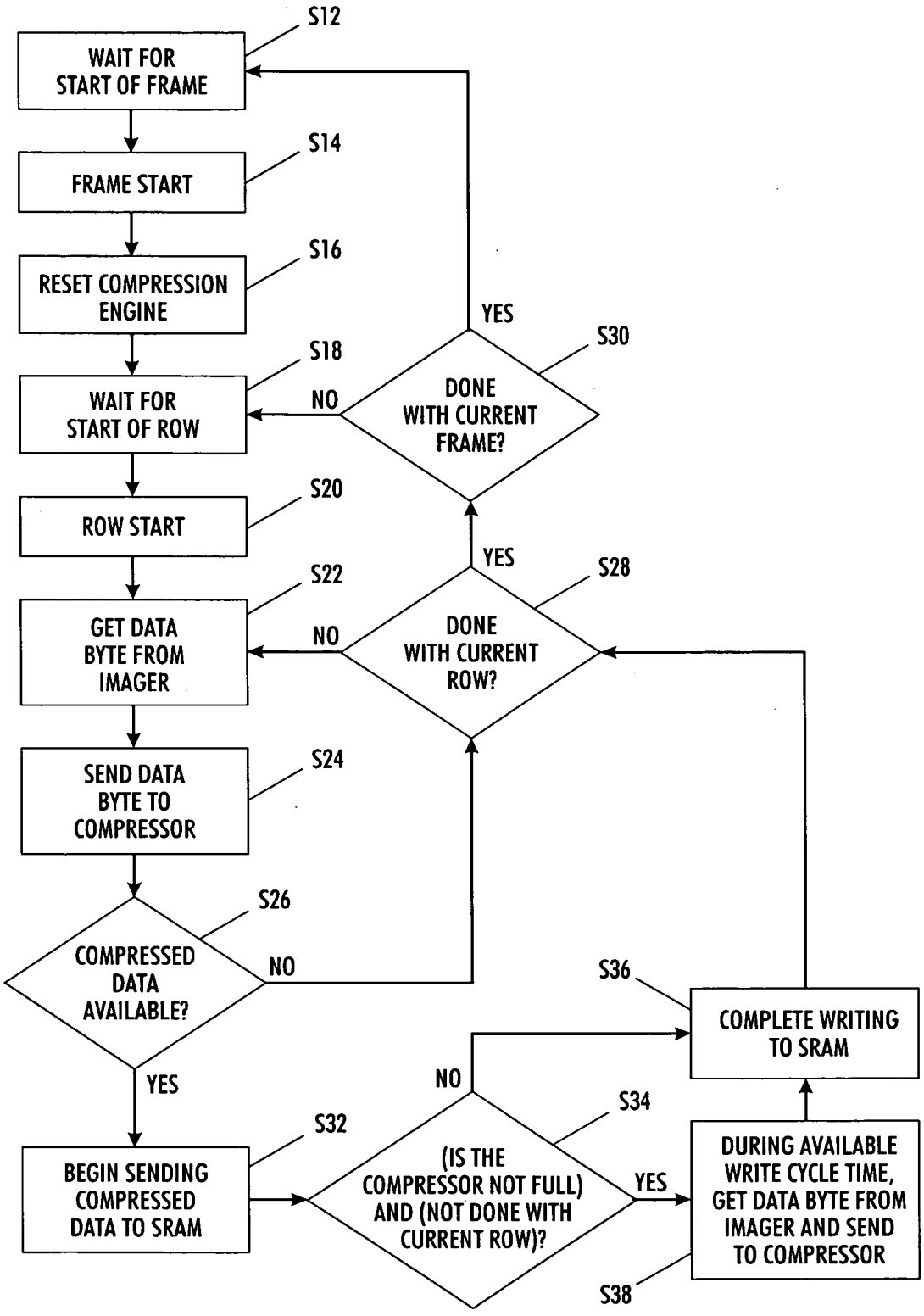
S12
WAIT FOR START OF FRAME
S14
FRAME START
S16
RESET COMPRESSION ENGINE
S18
WAIT FOR START OF ROW
S20
ROW START
S22
GET DATA BYTE FROM IMAGER
S24
SEND DATA BYTE TO COMPRESSOR
S26
COMPRESSED DATA AVAILABLE?
NO
YES
S30
DONE WITH CURRENT FRAME?
YES
NO
S28
DONE WITH CURRENT ROW?
YES
NO
S32
BEGIN SENDING COMPRESSED DATA TO SRAM
S34
(IS THE COMPRESSOR NOT FULL) AND (NOT DONE WITH CURRENT ROW)?
YES
NO
S36
COMPLETE WRITING TO SRAM
S38
DURING AVAILABLE WRITE CYCLE TIME, GET DATA BYTE FROM IMAGER AND SEND TO COMPRESSOR

FIG. 4

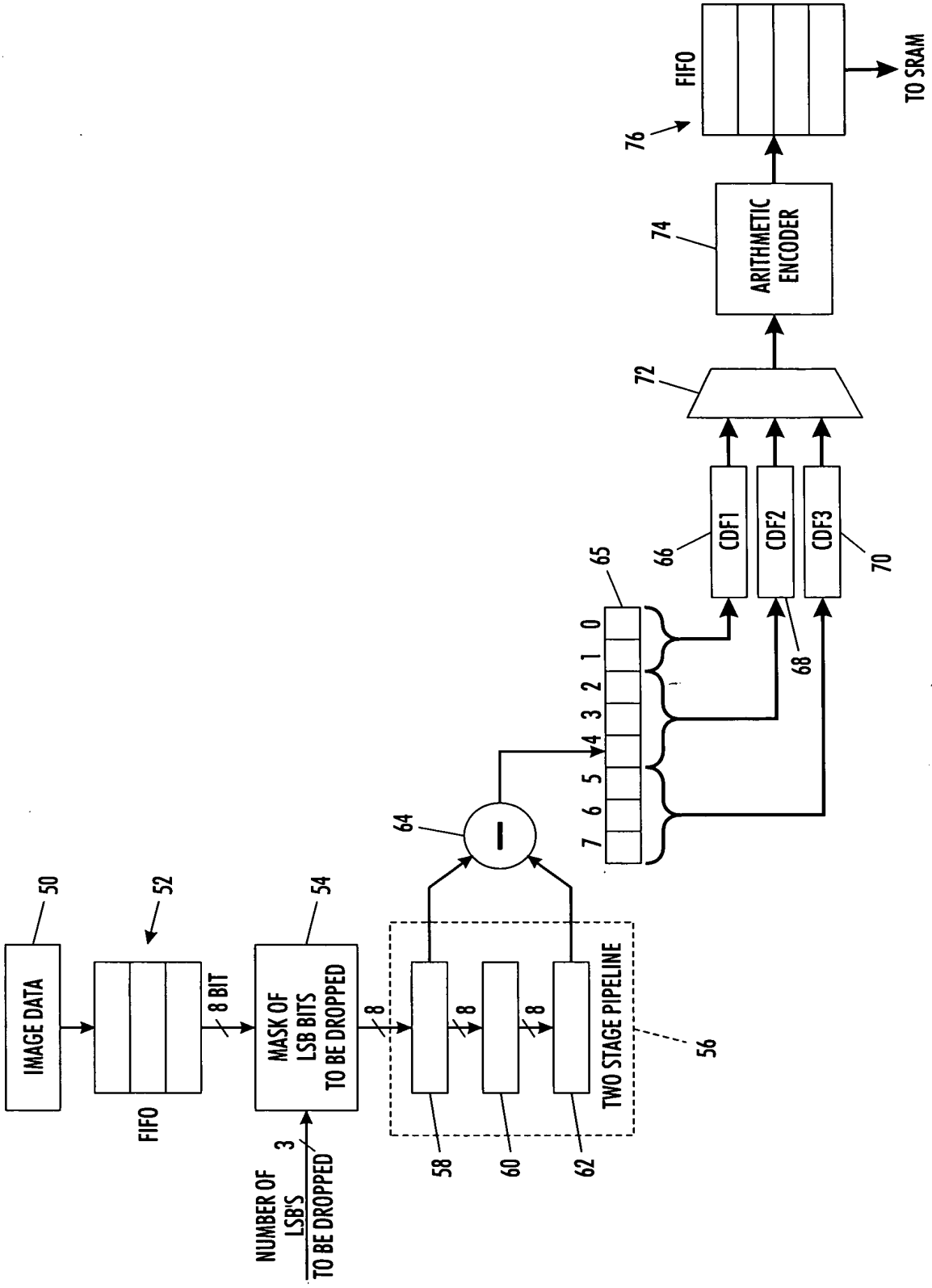
IMAGE DATA
50
FIFO
52
8 BIT
MASK OF LSB BITS TO BE DROPPED
54
NUMBER OF LSB'S TO BE DROPPED
3
8
8
8
8
58
60
62
TWO STAGE PIPELINE
56
64
7 6 5 4 3 2 1 0
65
CDF1
CDF2
CDF3
66
68
70
72
ARITHMETIC ENCODER
74
FIFO
76
TO SRAM

FIG. 5

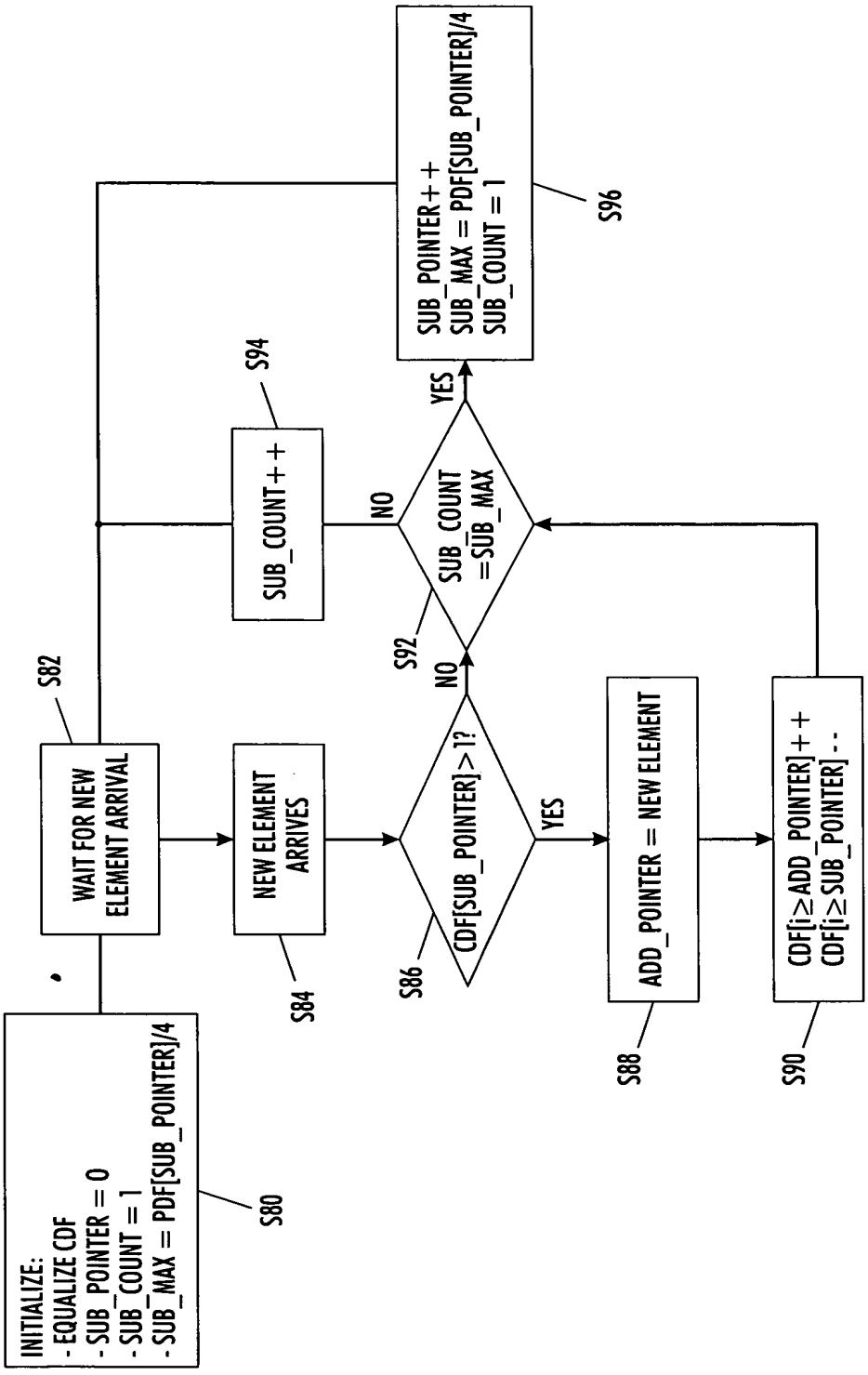
INITIALIZE:
- EQUALIZE CDF
- SUB_POINTER = 0
- SUB_COUNT = 1
- SUB_MAX = PDF[SUB_POINTER]/4
S80
WAIT FOR NEW ELEMENT ARRIVAL
S82
NEW ELEMENT ARRIVES
S84
CDF[SUB_POINTER]>1?
S86
NO
YES
SUB_COUNT =SUB_MAX
S92
NO
YES
SUB_COUNT++
S94
SUB_POINTER++
SUB_MAX = PDF[SUB_POINTER]/4
SUB_COUNT = 1
S96
ADD_POINTER = NEW ELEMENT
S88
CDF[i≥ADD_POINTER]++
CDF[i≥SUB_POINTER]--
S90

FIG. 6

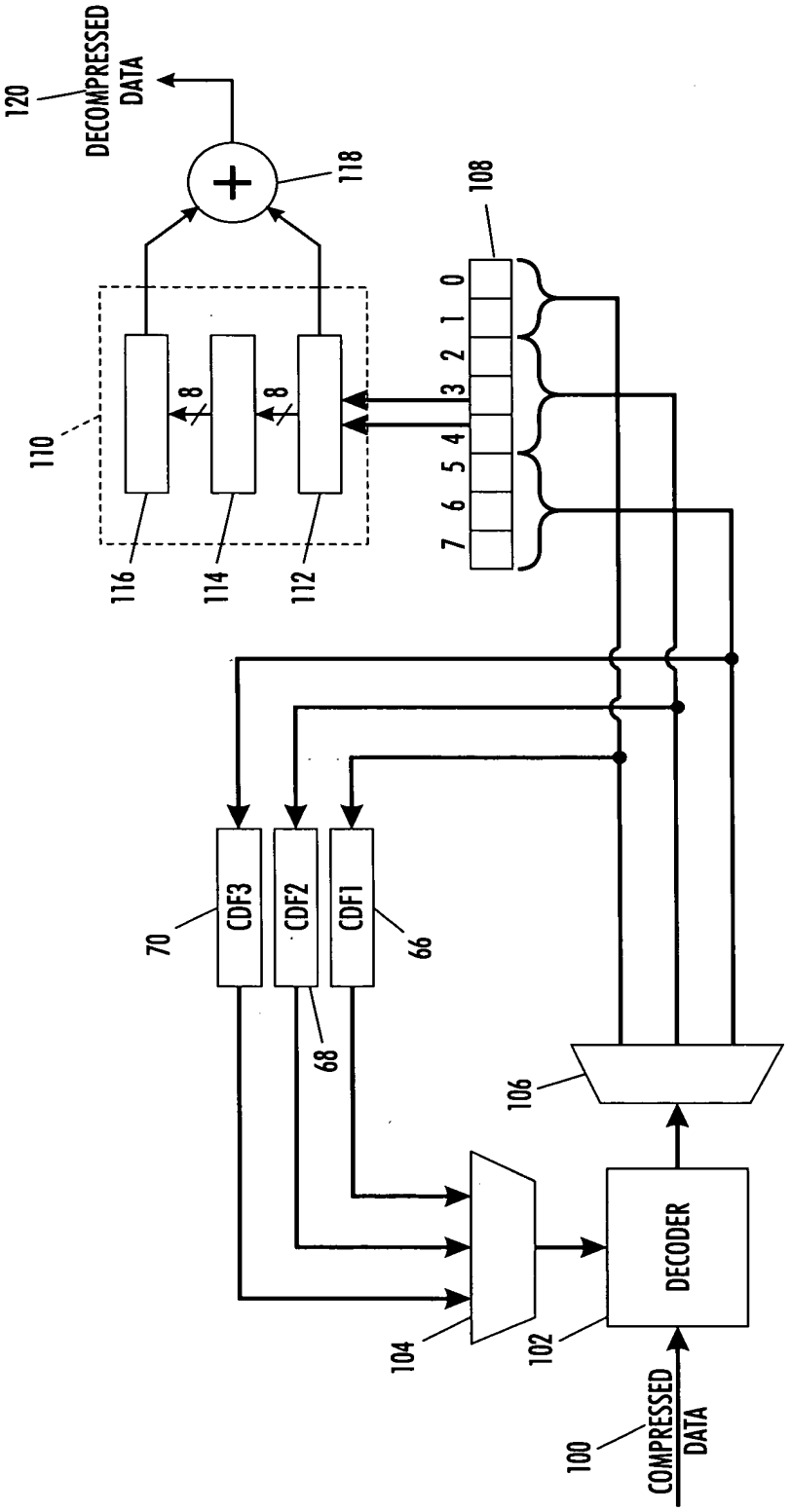
COMPRESSED DATA
100
DECODER
102
104
106
CDF3
CDF2
CDF1
70
68
66
108
0
1
2
3
4
5
6
7
110
8
8
116
114
112
118
+
DECOMPRESSED DATA
120

FIG. 7

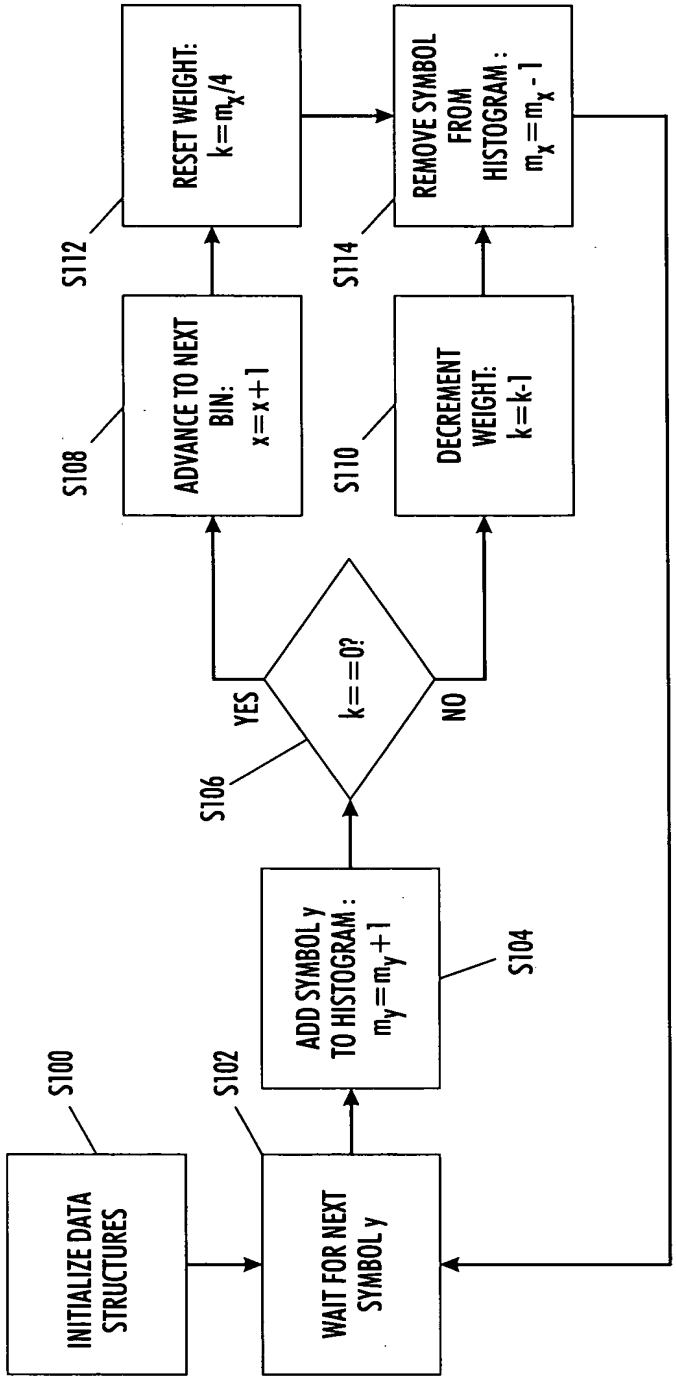
INITIALIZE DATA STRUCTURES
S100
WAIT FOR NEXT SYMBOL y
S102
ADD SYMBOL y TO HISTOGRAM : $m_y = m_y + 1$
S104
k==0?
S106
YES
NO
ADVANCE TO NEXT BIN: x=x+1
S108
RESET WEIGHT: $k = m_x/4$
S112
DECREMENT WEIGHT: k=k-1
S110
REMOVE SYMBOL FROM HISTOGRAM : $m_x = m_x - 1$
S114

FIG. 8

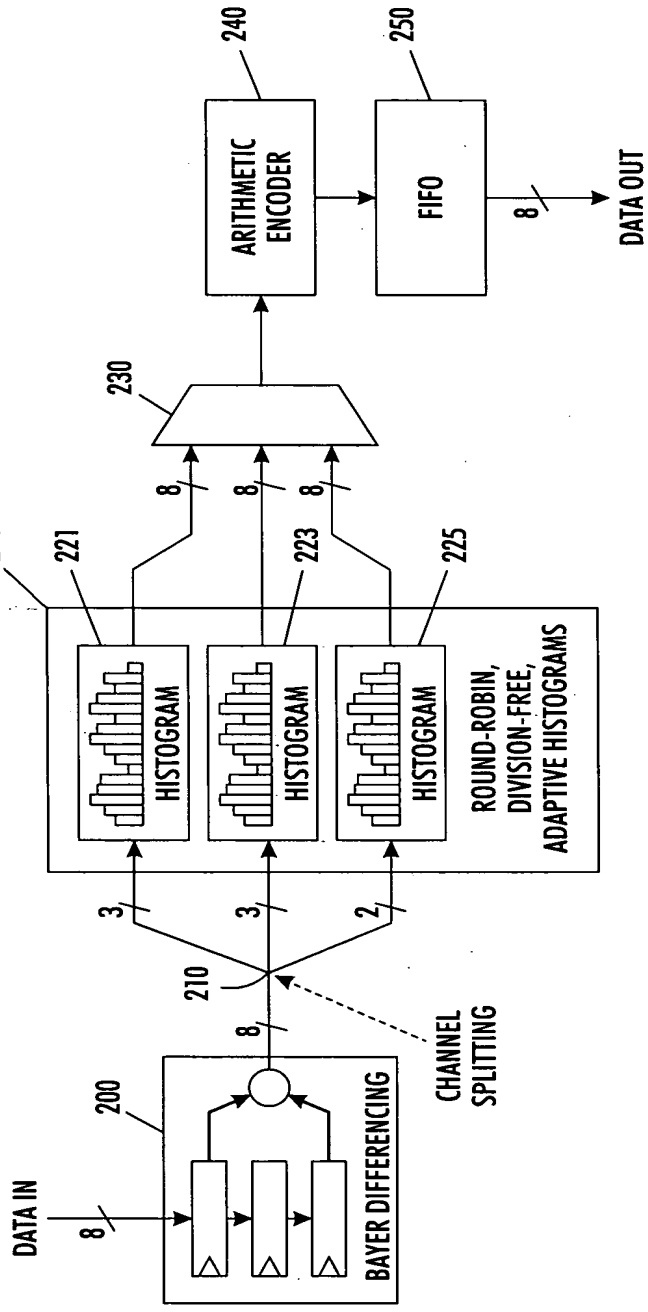
DATA IN
8
200
BAYER DIFFERENCING
8
210
CHANNEL SPLITTING
3
3
2
220
221
223
225
HISTOGRAM
HISTOGRAM
HISTOGRAM
ROUND-ROBIN, DIVISION-FREE, ADAPTIVE HISTOGRAMS
8
8
8
230
240
ARITHMETIC ENCODER
250
FIFO
8
DATA OUT

FIG. 9